Electronic Supplementary Material (ESI) for RSC Advances.

Supplementary Data

Synthesis and Characterization of a Lactose-Based Biosurfactant by a Novel Nanodendritic Catalyst and Evaluating its Efficacy as Emulsifier in a Food Emulsion System

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Tables

Table 1S. Chemical composition and physicochemical properties of the multi-functional nano-dendritic catalyst.

Samples	Elemental Analysis (wt%)[a]		OFG[b]		LR (%)[d]	Structural Parameters[e]		
	C	N	CHN	BT[c]		S_{BET} (m^2/g)	V_{BJH} (cm^2/g)	MPD (mm)
$MBNP_S$	-	-	-	-	-	71.0	0.17	8.53
L_2@MBNP	8.14	5.20	3.69	3.64	-	55.2	0.11	14.2
$G_{0.5}$ L_2@MBNP	10.7	3.90	2.75	2.80	-	37.4	0.90	15.7
$G_{1.0}$ L_2@MBNP	9.25	7.21	4.37	4.02	-	28.4	0.85	20.2
$G_{1.5}$ L_2@MBNP	7.85	8.03	6.32	5.85	-	22.8	0.79	23.1
Met-$G_{2.0}$ L_2@MBNP	6.10	9.23	6.58	6.25	-	18.4	0.72	26.5
Mn^{II}-$G_{2.0}$ L_2@MBNP	5.34	6.35	-	-	54	16.5	0.64	27.4
Co^{II}-$G_{2.0}$ L_2@MBNP	5.09	6.12	-	-	57	16.3	0.63	27.6

[a]Carbon and Nitrogen was estimated from the elemental analyses.
[b]Organic functional group determined from the N-contents.
[c] Back titration.
[d] Loading rate of metal ions.
[e] Pore size calculated using BJH method**.**

Table 2S. Reaction condition applied for synthesis of biosurfactant.

Entry	Catalyst[a]	Lac	Lac:LauA	Solvent	T(°C)	Conversion[b] (%)	Yield (%)
1	-	PLac	1:2	ACN	50	trace	trace
1	Co-$G_{2.0}L_2$@SCMB	PLac	1:1	ACN	50	29.5	21
2	Co-$G_{2.0}L_2$@SCMB	PLac	1:1	ACN	60	48.3	38
3	Co-$G_{2.0}L_2$@SCMB	PLac	1:2	ACN	40	66.7	55
4	Co-$G_{2.0}L_2$@SCMB	PLac	1:2	ACN	50	92.5	87
5	Co-$G_{2.0}L_2$@SCMB	PLac	1:2	ACN	55	93	87
6	Co-$G_{2.0}L_2$@SCMB	PLac	1:1	ASTN	50	41.9	38
7	Co-$G_{2.0}L_2$@SCMB	PLac	1:2	ASTN	50	84.1	74
8	Co-$G_{2.0}L_2$@SCMB	RLac	1:2	ACN	50	32.14	-
9	Co-$G_{2.0}L_2$@SCMB	RLac	1:2	ACN	55	39.3	-
10	Co-$G_{2.0}L_2$@SCMB	RLac	1:2	ASTN	50	17.3	-
11	Mn-$G_{2.0}L_2$@SCMB	PLac	1:1	ACN	50	43	31
12	Mn-$G_{2.0}L_2$@SCMB	PLac	1:2	ACN	50	89.4	83
13	Mn-$G_{2.0}L_2$@SCMB	PLac	1:1	ASTN	50	37.3	33
14	Mn-$G_{2.0}L_2$@SCMB	PLac	1:2	ASTN	50	82.3	72
15	Mn-$G_{2.0}L_2$@SCMB	PLac	1:2	ACN	55	89.4	83
16	Mn-$G_{2.0}L_2$@SCMB	RLac	1:1	ACN	60	47.6	36
17	Mn-$G_{2.0}L_2$@SCMB	RLac	1:2	ACN	50	29.3	-
18	Mn-$G_{2.0}L_2$@SCMB	RLac	1:2	ACN	60	35.2	-
19	Mn-$G_{2.0}L_2$@SCMB	RLac	1:1	ASTN	50	13.2	-

[a] Reaction condition: [Co^{II}-Cat] =30.0 mg, [Solvent] =6 mL, [MS] =600 mg, *t*=6 h, T=50 °C; [Mn^{II}-Cat] =40.0 mg, [Solvent] =6 mL, [MS] =600 mg, *t*=8 day, T=50 °C; [b] Conversion measured by Conv., %= (∑S, % LauA)/ (∑ S, %Substrate+∑%S, % Biosurfactant) ×100 %.

Figures

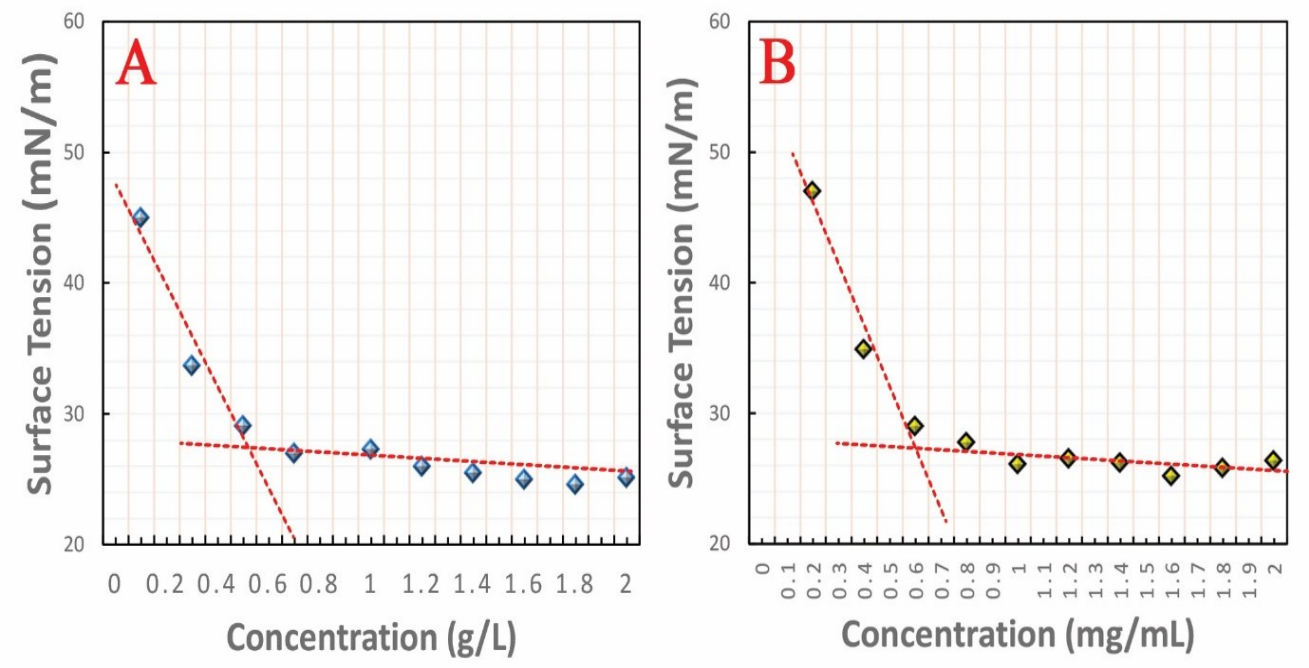

Fig. 1S. Surface tension versos concentration plot of biosurfactant by (**A**) Co^{II}-$G_{2.0}L_2$@SCMB; (**B**) Mn^{II}-$G_{2.0}L_2$@SCMB.

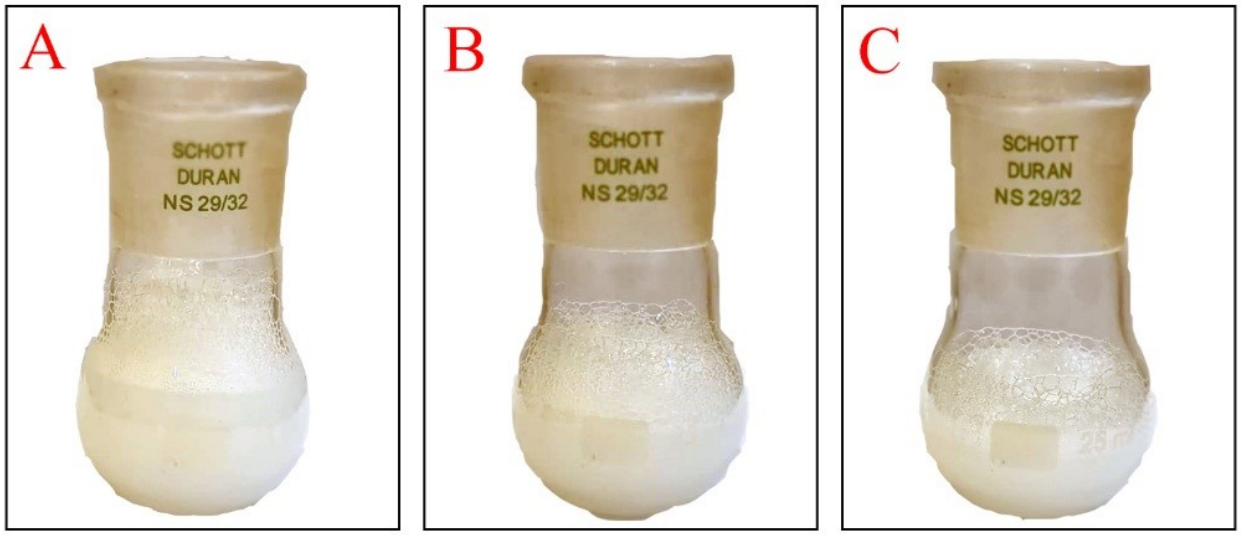

Fig.2S. Construction of foam in the presence of LML (aq) with concentration (g/L) (**A**) 0.6, (**B**) 0.4 & (**C**) 0.2.

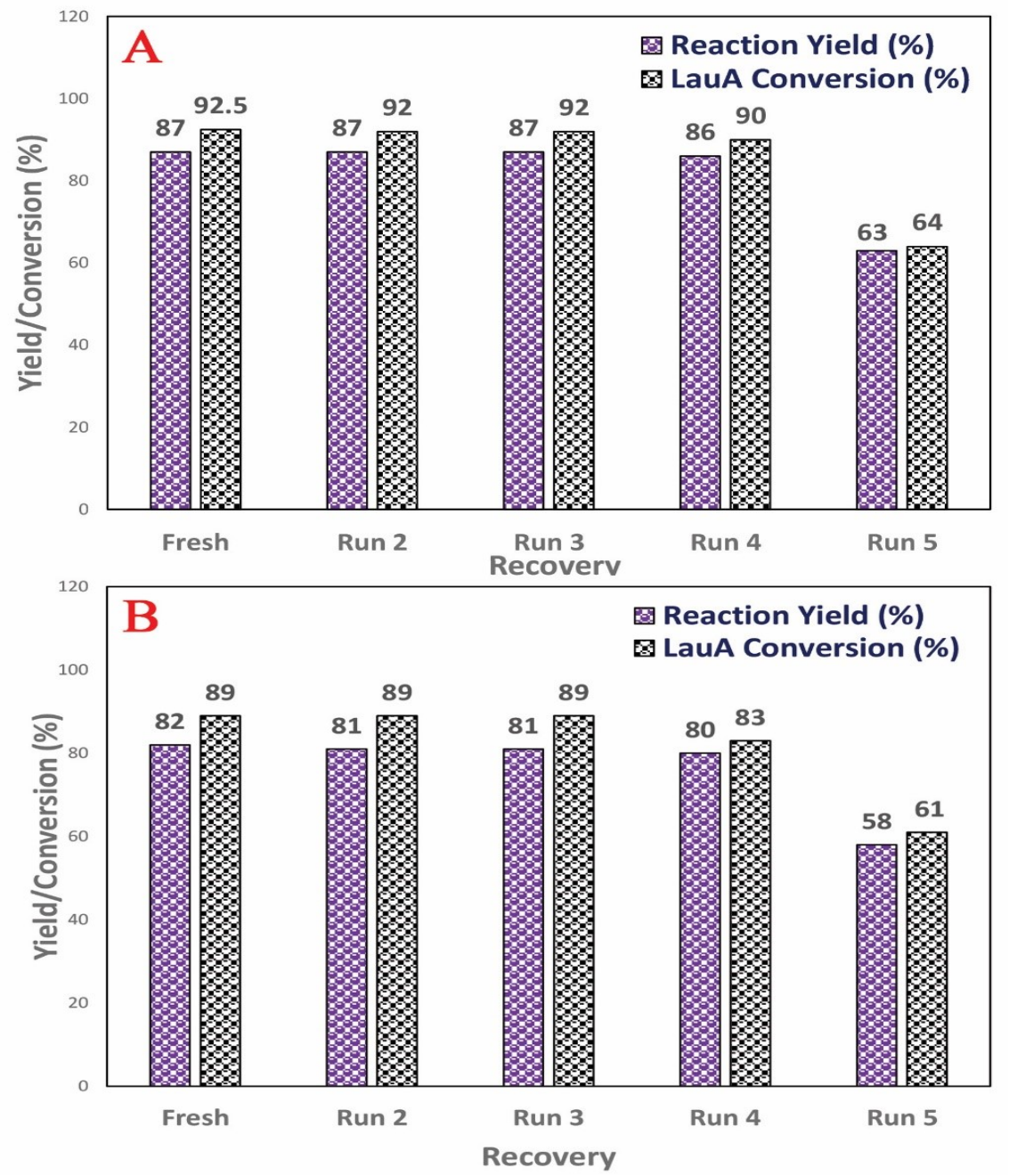

Fig.3S (**A**) Reusability of Co^{II}-$G_{2.0}L_2$@SCMB in synthesis of biosurfactant; (**B**) Reusability of Mn^{II}-$G_{2.0}L_2$@SCMB in synthesis of biosurfactant.